United States
Environmental
Protection Agency

Office of Emergency
and Remedial
Response (OERR)

EPA 540-R-01-002
OSWER 9355.0-77
March 2001

Updating Remedy Decisions at Select Superfund Sites

Cumulative Summary Report
FY 1996 Through FY 1999

Executive Summary (FY96 - FY99)

During its first four years of implementation, *Updating Remedy Decisions* has been characterized by the U.S. General Accounting Office (GAO) as one of EPA's most successful Superfund Reforms. From FY96 through FY99, EPA updated **over 300 remedies**, reducing estimated future cleanup costs by **more than $1.4 billion**, while at the same time increasing estimated future cleanup costs by $128.7 million. Other key successes and findings include the following:

- Most remedy updates completed from FY96 through FY99 were the result of additional technical information gathered as part of the remedy design process. A small number of remedy updates were the result of non-technical changes requirements (ARARs), land use, or required cleanup levels. Another small number of remedy updates were the result of state input or community preference, which focused on either technical or non-technical modifications to the remedy.

- EPA tracked over 300 remedy updates from FY96 through FY99, most of which were reform-related.

  - The total estimated future cost reductions (cost savings) for 64 remedy updates completed in FY96 were in excess of $350 million, of which over $325 million was based on scientific and technological advancements.

  - For 84 remedy updates completed in FY97, the total estimated cost savings were in excess of $390 million, of which over $270 million was based on scientific and technological advancements.

  - For 76 remedy updates completed in FY98, the total estimated cost savings were in excess of $280 million, of which over $245 million was based on scientific and technological advancements.

  - For 83 remedy updates completed in FY99, the total estimated cost savings were in excess of $430 million, of which over $420 million was based on scientific and technological advancements.

  - Less than one in every 10 updated remedies resulted in an increase in estimated remedy costs.

  - During this four-year period, 29 remedy updates reflected an increase in costs: no updates in FY96; five updates in FY97 that resulted in cost increases totaling an estimated $13.5 million; 10 updates in FY98 that resulted in cost increases totaling an estimated $57.2 million; and 14 updates in FY99 that resulted in cost increases totaling an estimated $58.0 million.

- Estimated cost savings for 206 remedy updates from FY96 through FY99 ranged from a negligible amount to over $87 million, with most of these updates generating savings under $10 million. Estimated cost increases for 29 individual remedy updates completed from FY96 through FY99 ranged from $10,000 to over $44 million, with a majority under $1.5 million.

- Remedy updates generally occurred in the remedial design phase of the cleanup process and were more likely to be documented with Explanations of Significant Differences (ESDs) than Record of Decision (ROD) Amendments. Over the four-year period, there were **207 ESDs and 93 ROD Amendments** representing remedy updates, with both cost savings and increases.

- Most remedy updates from FY96 through FY99 were initiated by parties outside EPA *(e.g.*, potentially responsible parties (PRPs), states, communities, federal facilities). Over the four-year period, **parties outside of EPA initiated 156 updates and EPA initiated 89 updates** (these numbers do not include 62 updates initiated by more than one party). These numbers are consistent with the percentage of EPA vs. non-EPA parties conducting cleanup work (*e.g.*, since the inception of Superfund, the lead for remedial design is approximately 70 percent non-EPA and 30 percent EPA).

- Over the four-year period, **soil (175 updates)** and **groundwater (129 updates)** were the **most common media** addressed. Another eight media types and an "other" category were also addressed by remedy updates from FY96 through FY99. [See *Exhibit 1.3* on page 5 for more details on all media types

affected.] This is consistent with ratios of remedies found at other Superfund sites.

- In each year, the majority of ESDs and ROD Amendments took less than one year to complete.
- For remedy updates completed during FY96 through FY99 in which the originally selected remedy included a treatment component for both soil or groundwater media, EPA also selected an updated remedy that included a treatment component at a majority of sites. [See *Tables D* and *E* on pages 9 and 10.]
- The number of remedy updates completed by each EPA region during FY96 through FY99 clearly shows that all ten regions are implementing this reform, with **most regions reporting estimated cost savings above $50 million for the four fiscal years combined**.

Table of Contents

This page left blank intentionally

1.0 Introduction

Updating Remedy Decisions, announced in the third round of Superfund Reforms in October 1995, is one of a broad range of administrative reforms undertaken to improve efficiency, speed, and fairness of the Superfund program. The purpose of the Reform is to encourage the EPA Regions to revisit selected remedy decisions at sites where significant new scientific information, technological advancements, or other considerations will be the basis to revise remedies that protect human health and the environment while enhancing overall remedy cost effectiveness.

This report discusses remedy updates made from FY96 through FY99. For remedy updates completed in FY96 and FY97, see the document, "*Updating Remedy Decisions at Select Superfund Sites, Summary Report, FY 1996 and FY 1997*," July 1998, OSWER Directive 9355.0-70. This document may be obtained on the Internet at the EPA Superfund Reforms Website at: **http://www.epa.gov/oerrpage/superfund/programs/reforms/docs/urd96-97.pdf**. The Summary Report for FY96 and FY97 contains background information on the Reform, a description of the Reform, the process for implementing the Reform, and regional implementation plans from each of the ten EPA Regions. For remedy updates completed in FY98 and FY99, see the document, *"Updating Remedy Decisions at Select Superfund Sites, Summary Report, FY 1998 and FY 1999,"* July 2000, OSWER Directive 9355.0-76. Additional information regarding the Reform description, status, results, stakeholder comments, documents, and EPA contact can be obtained from the EPA Superfund Reforms website at : **http://www.epa.gov/oerrpage/superfund/programs/reforms/reforms/3-2htm**.

This report:

- Provides a summary of information for those Superfund sites where remedies have been updated over the first four years of Reform implementation;
- Highlights national and EPA regional estimated future cost reductions (cost savings) or cost increases expected to result from implementing updated remedies; and
- Presents stakeholders with information on the role of remedy updates in improving Superfund implementation.

From the Reform's inception, EPA sought to encourage remedy updates that would incorporate new technical/scientific information into existing site cleanups. As a whole, the administrative reforms were implemented to make Superfund faster, fairer, and more efficient.

It is important to emphasize that this initiative does not signal any variations in the Agency's current policies regarding site cleanup, including policies on remedy selection, treatment of principal threats, preference of permanent remedies, establishment of cleanup levels, or the degree to which remedies must protect human health and the environment. EPA remains committed to the protection of public health, welfare, and the environment.

2.0 FY96 through FY99 Results

More than 300 remedy updates were completed in FY96 through FY99, saving over $1.4 billion in estimated site cleanup costs, while at the same time creating increases in estimated site cleanup costs of about $128.7 million or less than 10% of the remedies reviewed.

Detailed information regarding individual remedy updates can be found in Appendices A, A.1, and A.2 of the document, *"Updating Remedy Decisions at Select Superfund Sites, Summary Report, FY 1998 and FY 1999,"* July 2000 and in the document, *"Updating Remedy Decisions at Select Superfund Sites, Summary Report, FY 1996 and FY 1997,"* July 1998. Specific remedy updates are listed by Region, and alphabetically by site name, and include the following information:

- Type and date of remedy update;
- Update initiator;
- Media involved;
- State and community involvement;
- Estimated resource demands;
- Estimated cost savings or cost increases; and
- Summary of remedy change and factual basis.

Table A shows the number and kind of remedy updates that were completed during the first four years of the Reform. (Note: In several instances, information regarding the particular kind of remedy update is either unavailable to EPA or incomplete at the time of this writing. These are labeled NA/TBD (Not available/To be determined)).

Table A: Number and Kind of Remedy Updates for FY96 Through FY99

	FY96	FY97	FY98	FY99	Total
Total # of Updates (*)	64	84	76	83	307
# Updates With Est. Savings	49	59	48	50	206
# Updates With No Savings	8	11	12	11	42
# Updates With Est. Increases	0	5	10	14	29
# Updates NA or TBD	7	9	6	8	30

** Note: Eight remedy updates were completed in one year, but not reported until a later year. This, however, does not significantly alter the number of updates per year. When this occurred, the update was counted only once in the latter year.*

The information in *Table A* shows a somewhat consistent pattern in the 4 categories - total number of updates per year, number of updates with estimated savings, number of updates with no savings, and number of updates where the cost changes were not available or have not yet been determined. There does appear to be a slight increasing trend in the number of updates with estimated cost increases. The updates with estimated cost increases occurred in seven EPA Regions (2, 3, 4, 5, 8, 9, and 10) and ranged from a minimum of two to a maximum of seven updates per Region. There is no dominant Region with a higher proportion of remedy updates with cost increases compared to other Regions.

Table A also shows that some remedy updates generated neither cost savings nor cost increases; however, EPA tracked all completed remedy updates in 4 categories: 1) estimated savings, 2) estimated increases, 3) no reported savings or increases, and 4) estimated savings or increases that could not be quantified. Since some cost numbers have not been quantified, EPA believes that the numbers reported in *Table A* for both the estimated costs savings and increases are conservative and will increase when additional costs are calculated by the party-lead for the remedy update.

Similarly, not all remedy updates were Reform-related. EPA tracked both Reform-related and non-Reform-related updates. Reform-related updates include those based on new technical information, new science, and

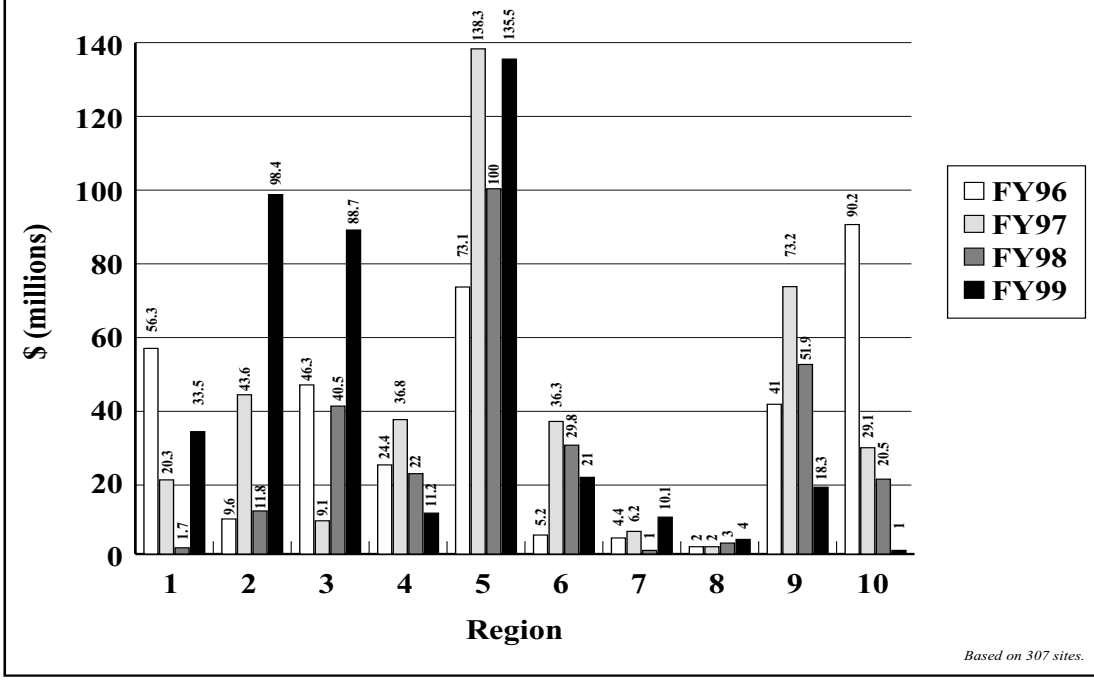
greater advancements in technology. (See the Reform Guidance, *"Superfund Reforms: Updating Remedy Decisions,"* OSWER Directive 9200.2-22, dated September 27, 1996 and see also the EPA Superfund Reforms website at **http://www.epa.gov/superfund/programs/reforms/remedy/index.htm**.) Non-reform-related updates include changes in applicable relevant and appropriate requirements (ARARs), land use, or required cleanup levels.

A breakdown of Reform- versus non-Reform-related updates demonstrates the following:

- 64 updates completed during FY96 resulted in a total estimated cost savings of over $350 million, of which over $325 million resulted from updates of the kind identified in the Reform Guidance;
- 84 updates completed during FY97 resulted in a total estimated cost savings of over $390 million, of which over $290 million resulted from updates of the kind identified in the Reform Guidance.
- 76 updates completed during FY98 resulted in a total estimated cost savings of over $280 million, of which over $245 million resulted from updates of the kind identified in the Reform Guidance.
- 83 updates during FY99 resulted in a total estimated cost savings of over $430 million, of which over $420 million resulted from updates of the kind identified in the Reform Guidance.

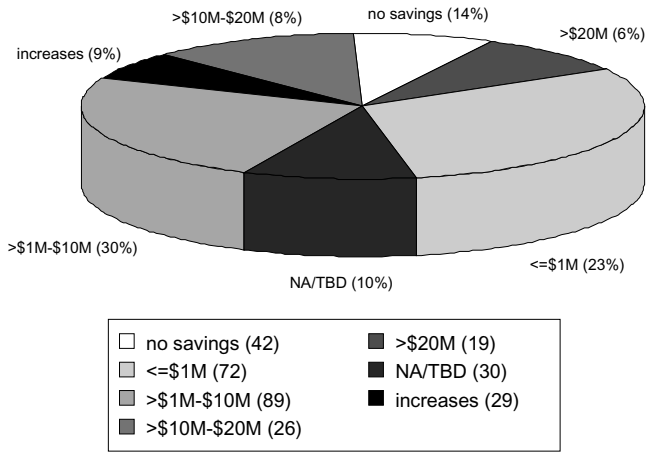
The data over the past four years fail to show a trend in the number of remedy updates completed in a given year, either Reform-related or not related to the Reform.

Exhibit 1.1: Estimated Remedy Update Savings by Region for FY96 Through FY99



Over the first four years of the Reform, there were over 200 individual remedy updates that generated estimated cost savings. The estimated cost savings per update ranged from a negligible amount to $87 million. All EPA Regions reported savings in each year reviewed. *Exhibit 1.1* shows the amount of estimated savings by Region and by fiscal year. (Note: *Exhibit 1.1* is the most complete representation of remedy updates over the past four years; however, it may not include all remedy updates because of limitations on Regional accessibility to remedy update information.)

Exhibit 1.2: Estimated Savings Per Remedy Update for FY96 through FY99



Although there is a vast range in remedy updates that generated cost savings, most of these remedy updates generated savings of less than $10 million, as shown in *Exhibit 1.2*. These data were tracked biannually and the picture found in *Exhibit 2.2* in the document *"Updating Remedy Decision at Select Superfund Sites, Summary Report, FY 1998 and FY 1999,"* July 2000, for FY 1998 and FY 1999, is consistent with the results contained in the document *"Updating Remedy Decision at Select Superfund Sites, Summary Report, FY 1996 and FY 1997,"* July 1998. The only category in the FY 1998 and FY 1999 report that shows a significant trend is the number of remedy updates that generated cost increases from 3 to 13 percent. This occurs because the cost increase category was not separated into cost components similar to the multiple cost savings categories. If cost increases were separated into multiple cost categories, a majority of remedy updates with estimated cost increases would be less than $1.5 million.

EPA also tracked 29 individual remedy updates that generated cost increases during the first four years of the Reform. Since there were no remedy updates completed with estimated cost increases in FY96, EPA Regions reported remedy updates which generated cost increases during FY97 through FY99 only.

- The FY97 cost increases, which were reported for 5 remedy updates, totaled $13.5 million.
- The FY98 cost increases, which were reported for 10 remedy updates, totaled $57.2 million.
- The FY99 cost increases, which were reported for 14 remedy updates, totaled $58.0 million.

Over the past four years, there has been an increase in the number of remedy updates that generate cost increases. The major reasons for cost increases in remedy updates are as follows: 1) identification of additional contamination compared to what was identified in the original ROD; 2) inability of the originally selected remedy to meet the site cleanup goals; and 3) lack of available technologies (either innovative or demonstrated) that succeed, so that the only protective, ARAR-compliant alternative is a more costly alternative compared to the original remedy.

Recent advances in the area of soil and ground water science and remediation made these media good candidates for remedy updates. *Exhibit 1.3* shows the ten most common media, as well as an "other" category. From FY96 through FY99, updates of soil remedies were the most common remedy updates (175), followed by ground water remedy updates (129). The data in *Exhibit 1.3* do not exhibit a trend or pattern for soil or ground water media over the four-year period. (See Section 4.0, beginning on page 9 of this report, for a comparison of soil and ground water remedies with treatment components of original and updated remedies.)

Exhibit 1.3: Updates by Medium for FY96 through FY99

Medium	FY96*	FY97*	FY98	FY99	Total
Soil	37	39	50	49	175
Ground Water	26	45	31	27	129
Sediment	3	8	6	11	28
Debris	5	5	9	3	22
Sludge	3	2	3	3	11
Leachate	4	2	1	2	9
Surface Water	2	4	2	1	9
Other	0	0	4	3	7
Solid Waste	3	3	0	0	6
Air	1	1	1	2	5
Gas	2	0	1	2	5

** Note: This information has been updated and consequently has changed marginally from that reported in "Updating Remedy Decisions at Select Superfund Sites, Summary Report, FY 1996 and FY 1997," July 1998.*

The information in *Exhibit 1.3* is based on 307 sites. However, since remedy updates often involve more than one medium at a site, the total number of updates by medium is more than 307.

After soil and ground water updates, there is a substantial drop-off in the number of updates among the remaining eight media and the other category. Although there are numerous fluctuations from year to year, there does not appear to be a major increase of drop off in a particular medium. The number of updates in *Exhibit 1.3* is consistent with media typically found at contaminated sites.

The information gathered for the Reform also tracked the initiator of the update. *Table B* shows the number of updates associated with the party responsible for the update, as reported by the ten EPA Regions:

Table B: Breakdown of Update Initiators by Fiscal Year

Update Initiator	FY 96	FY 97	FY 98	FY 99	Total
PRP	31	37	21	30	119
EPA	14	20	24	31	89
Joint (*)	11	13	25	13	62
Federal Facility	2	10	2	4	18
State	5	2	3	4	14
Local Gov't./Community	1	2	1	1	5

** Note: A designation of "joint" means that more than one party began the update process. This occurs when multiple parties review the same data at the same time and reach the same remedial conclusion.*

Over the first four years of implementing this Reform, several variations regarding the initiator of the remedy update were observed. Fluctuations in the number of PRP-lead and Joint-lead updates appear to be inversely related without explanation. The data also offer little explanation for the gradual increase in the number of EPA-lead updates and a fluctuation in the number of Federal-facility-lead updates. The two remaining categories do not show any fluctuations.

During the first four years of implementing the Reform, EPA tracked each remedy update and its relationship to the kind of change documenting the record. Minor or non-significant updates were documented as memos or notes to the Administrative Record file. A significant update was documented an ESD. A fundamental update was documented as a ROD Amendment. The following table contains the number of updates per year.

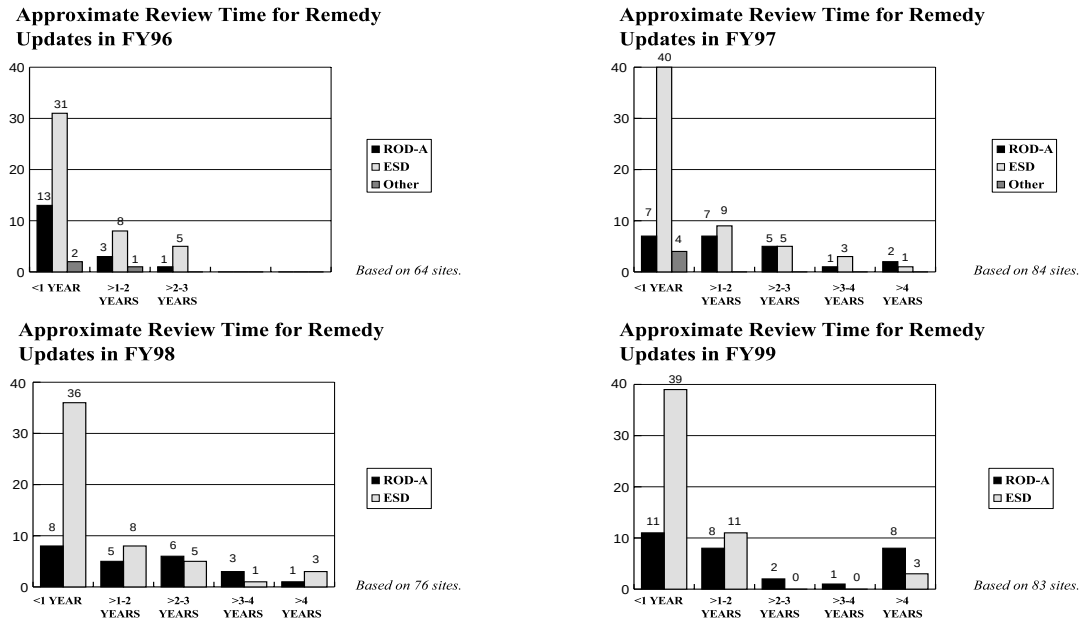
Table C: Types of Remedy Updates and Percentages by Fiscal Year

Type	FY96	FY97	FY98	FY99	Total
ESD	44 (69%)	58% (69%)	53 (71%)	52 (63%)	207
ROD Amendment	17 (26%)	22 (26%)	23 (29%)	31 (37%)	93
Other (Note/Memo)	3 (5%)	4 (5%)	0	0	7

Table C shows only slight variations in the number of update documents per fiscal year. As mentioned above, the type of update document selected is determined by the extent of the difference between the original remedy and the updated remedy. In summary, most remedy updates are modifications to the originally selected remedy and not completely new remedies.

In both the document *"Updating Remedy Decision at Select Superfund Sites, Summary Report, FY 1998 and FY 1999,"* July 2000, and the document *"Updating Remedy Decision at Select Superfund Sites, Summary Report, FY 1996 and FY 1997,"* July 1998, EPA tracked the amount of time needed review the new site-specific material and complete the appropriate update document. *Exhibit 1.4* summarizes the approximate review time for remedy updates completed in the first four years of the Reform.

Exhibit 1.4: Approximate Review Time for Remedy Updates



In each year, most of the ESDs and ROD Amendments took less than one year to complete. However, there does appear to be an increase in the number of ESDs and ROD Amendments taking more than one year to complete. An examination of these updates with longer review times shows that durations can be influenced by one or more of the following: site-specific complexities, other activities that precede the update (e.g., removal or source control action), and a protracted verification/pilot test period following discovery of new data.

3.0 Lessons Learned

Through four years of Reform implementation, EPA has gained insight into ways to successfully update site remedies. The following sections detail some of the information collected regarding the Reform process, Reform benefits, and comments from stakeholders.

3.1 Reform Process

The Reform process is described in Section 5.0 of the document *"Updating Remedy Decision at Select Superfund Sites, Summary Report, FY 1996 and FY 1997,"* July 1998. The document also contains plans for how each EPA Region intended to implement the Reform. EPA has not significantly changed the remedy update process since its inception and the issuance of the Reform Guidance document, "Superfund Reforms: Updating Remedy Decisions," OSWER Directive 9200.2-22, dated September 27, 1996. This continuity is demonstrated by the consistency of slight increases in the number of remedy updates and estimated cost savings over the first four years of Reform implementation. All ten EPA Regions have shown continued support and participation in implementing this Reform and continue to adhere to their implementation plans announced in 1997. The Reform process continues to function as intended and the results of the first four years do not suggest a need for a significant change.

3.2 Benefits

This Reform has been very successful in bringing past Superfund site decision-making in line with current science and technology. By doing so, these updates improve the cost effectiveness of site remediation while ensuring reliable short- and long-term protection of human health and the environment. The quantifiable results of this Reform have been announced in EPA's testimony before Congress, private industry evaluations of Superfund reforms, and a report of the GAO. Of additional note is EPA's overwhelmingly positive record of responding to remedy update requests made by outside parties.

Over the first four years of this Reform, there were many examples of updates based on new technology, new performance data, coordination among numerous parties, input from States and the public, calculations of money saved or additional resources needed, and quick turn-around time in completing the update. (See Section 4.2 in the document, *"Updating Remedy Decision at Select Superfund Sites, Summary Report, FY 1998 and FY 1999,"* July 2000, and Section 6.2 of the document *"Updating Remedy Decision at Select Superfund Sites, Summary Report, FY 1996 and FY 1997,"* July 1998.)

3.3 Stakeholder Comments

During the first four years of this Reform, EPA received much positive feedback from other government agencies and outside parties. Of note is the May 2000 U.S. General Accounting Office Report to Congressional Requesters titled, *"Superfund, Extent to Which Most Reforms Have Improved the Program is Unknown,"* (GAO/RCED-00-118). In this report, GAO notes that this Reform has several measurable goals, outcomes, and outputs. Several observations from GAO and various stakeholders are contained in *Exhibit 1.5*.

Exhibit 1.5: Stakeholder Comments on Remedy Updates*

Sustained Effects:

- EPA's data show that the regions are updating remedy decisions and achieving cost savings for both responsible parties and EPA.
- EPA predicts that at some point in the future, the regions will have reviewed most past remedies for an update and the opportunities to achieve additional cost savings will decrease.

Contribution of Other Factors:

- EPA acknowledges that other reforms addressing remedy selection, such as the directive providing more flexibility to assume that a site will be used for industrial rather than residential purposes and will therefore require less extensive cleanup, also deserve credit for contributing to the cost savings achieved.

Regional Implementation:

- Some industry representatives said that individual cleanup managers and regions differ in their willingness to consider a remedy for an update; as a result, the representatives believe they do not have a consistent opportunity to achieve cost savings.
- ...EPA's data show regional differences in the number of updates conduced-one region updated three times as many remedies as another...both regions managed about the same number of Superfund sites.
- EPA did not determine the reasons for the differences, but reform managers suggested that there could be a valid reason for them. For example, one region could have more sites with contaminated ground water-a type of site that would be a good candidate for a remedy update because new cleanup technologies have become available.

Performance Measurement:

- ...EPA admits that its estimates of cost savings are not rigorous, partly because the agency depends on private parties to provide estimates of cost savings for the cleanups they manage.
- ...EPA (1) does not maintain supporting documentation for the savings estimates, and (2) cannot require private parties to provide such documentation.

Views on the Reform's Benefits/Effectiveness:

- Industry representatives gave high marks to this reform for leading to more cost-effective cleanups.

**These comments are excerpted form Appendix 1 of the report, "Superfund: Extent to Which Most Reforms have Improved the Program is Unknown," published in May 2000 by the General Accounting Office.*

"There was great fear when EPA in 1995 announced its plans to review prior decisions on remedy selection. Some expected that nothing would change. Others feared the floodgates had been opened. What followed instead was an orderly and sound process. It involved a minority of sites where remedial action was underway, but at many of those sites changes were made that sharply reduced total costs without sacrifice of environmental protection."**

***Excerpted from "The Superfund Program At Its 20th Anniversary: Achievements of the Past, Challenges for the Future", Comments by the Superfund Settlements Project, December 11, 2000.*

"EPA has instituted a number of procedures to make sure that the best, and most up-to-date, information is used in deciding a cleanup remedy. These reviews continue even after a cleanup has started."***

****Excerpted from "Superfund: 20 Years of Protecting Human Health and the Environment", December 11, 2000.*

4.0 Remedy Updates and Treatment

CERCLA Section 104 and Section 300.430 of the National Contingency Plan (NCP), revised in 1990, require that each remedial action apply permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The NCP also states that, as part of the best balancing of trade-offs among alternatives, EPA shall consider the preference for treatment as a principal element and the bias against off-site land disposal of untreated waste. While Reviewing the information contained in remedy updates during the first four years of implementation, EPA evaluated the continued use of treatment in the original remedy compared to the updated remedy. The following two tables summarize the update information reported for the two most common media - soil and ground water:

Table D: Comparison of Soil Remedy Updates and Treatment Components

(1)	(2)	(3)	(4)	(5)
Year	**# of reviews with a soil component**	**# of reviews with treatment for soil component in the original remedy**	**# of updates with whole or partial soil treatment component in the updated remedy**	**# of updates with no soil treatment (e.g., containment only) in the updated remedy***
1996	37	27	17 (63%)	10 (37%)
1997	39	26	12 (46%)	14 (54%)
1998	50	32	22 (69%)	10 (31%)
1999	49	26	18 (69%)	8 (31%)
Total	175	111	69 (62%)	42 (38%)

** Note: This category includes soil remedies that went from on-site treatment to off-site disposal with no mention of treatment prior to disposal. Some updated soil remedies may have, in fact, treated before disposal so that these numbers overestimate the use of no treatment.*

Table D shows that over the first four years of the Reform there were 175 remedy updates with a soil component (Column 2) and, of these, 111 soil remedies included at least one treatment component in the original soil remedy (Column 3). Columns 4 and 5 compare treatment of the updated soil remedy to the original soil remedy. In the majority of updates with a soil component, approximately 62 percent, there is at least one treatment component in the updated soil remedy. This demonstrates that EPA's remedy updates continue to reflect a preference for treatment as a principal element of the soil remedy.

Table E: Comparison of Ground Water (GW) Remedy Updates and Treatment Components

(1)	(2)	(3)	(4)	(5)	(6)
Year	**# of reviews with a GW component**	**# of reviews with treatment for GW component in the original remedy**	**# of updates with whole or partial GW treatment component in the updated remedy**	**# of updates with no GW treatment or containment component in the updated remedy**	**# of updates that went from GW treatment to monitored natural attenuation**
1996	26	18	12 (67%)	5 (28%)	1 (5%)
1997	45	34	22 (64%)	6 (18%)	6 (18%)
1998	31	24	15 (62%)	5 (21%)	4 (17%)
1999	27	18	10 (56%)	2 (11%)	6 (33%)
Total	129	94	59 (63%)	18 (19%)	17 (18%)

Table E shows that over the first four years of the Reform, there were 129 remedy reviews with a ground water component (Column 2) and, of these, 94 were ground water remedies which included at least one treatment component in the original remedy (Column 3). Columns 4 and 5 compare treatment of the updated ground water remedy to the original ground water remedy. In the majority of updates with a ground water component, approximately 63 percent, there is at least one treatment component in the updated ground water remedy. This fact demonstrates that EPA's remedy updates continue to reflect a preference for treatment as a principal element of the ground water remedy. *Table E* also shows an increase in the frequency of updating ground water treatment remedies to monitored natural attenuation (MNA) remedies (Column 6). For purposes of this discussion, MNA has been separated from treatment methods. However, just as required of treatment remedies, MNA still needs to meet cleanup goals and cleanup levels in a reasonable time frame. The data show a significant percentage increase over time in the use of MNA. MNA tends to be used at most sites as a response action for the least contaminated portion of the contaminated plume and as a finishing step after active treatment or a source control response has been completed.

5.0 Conclusion

Generally, both EPA and outside parties consider *Updating Remedy Decisions* a successful Superfund Reform from FY96 through FY99. The number of remedy updates completed by each EPA Region during each fiscal year clearly shows that all ten Regions are implementing this reform, with most Regions reporting estimated cost savings above $50 million for the four fiscal years combined. All ten Regions continue to evaluate requests to review old Fund-lead remedies, as well as consider updates to more recent remedies that may not be up-to-date with current science or technology. Regions also continue to encourage outside parties to submit remedy update requests to EPA when new technical information exists to support them. For the most part, EPA and outside parties share the benefits of both cost and time savings as part of implementing the updated remedy.

Interested parties should review the existing Reform Guidance (OSWER Directive 9200.2-22) for basic information concerning the Reform. Additional guidance on remedy updates is included in the updated Record of Decision Guidance (see *"A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents,"* OSWER Directive 9200.1-23P, July 1999). Specific questions on implementation of this reform may be directed to Matt Charsky of the Office of Emergency and Remedial Response by telephone at (703) 603-8777, e-mail at **charsky.matthew@epa.gov**, or FAX at (703) 603-9133. Each Region also has a remedy update contact who can be accessed by contacting the Superfund Program area in any of EPA's ten regional offices.

Acknowledgments

This report was made possible by the dedicated efforts of numerous EPA Superfund staff. Regional remedial project managers (RPMs) responsible for considering and implementing remedy updates at Superfund sites are to be commended for making these changes to select the best technologies available at Superfund sites nationwide.

This report was prepared for EPA under contract #68-W6-0038.